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ARAŞTIRMA / RESEARCH

Paramedics Recognizing Extended Trauma Ultrasonography Images after Short Training Module

Paramediklerin Kısa Eğitim Modülü Sonrasında Genişletilmiş Acil Travma Ultrasonografi Görüntülerini Tanıyabilmesi

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Abstract

Objective: Our study aimed to test whether a one-hour short training model for Focused Assessment with Sonography in Trauma (FAST) training would increase the visual skills of paramedics who had no previous training in this field.

Material and Method: Our study was planned as a prospective, uncontrolled experimental study. A short training module was applied to 27 paramedics who were inexperienced in E-FAST Ultrasonography (USG). The first test was applied and the final test was applied after the training and their success in distinguishing normal and pathological case images was evaluated.

Results: 55.6% of the participants were women, 74.1% were new graduates, and their average age was 21.58 ± 9.60 years. When the answers given by the participants to the first test and the last test were evaluated; While 31.9% of the participants answered "I did not understand" to many questions in the first test, after the training, it was seen that 82.9% could form ideas for all tests. When the correct response rates of the participants to the first test and the last test were examined, a statistically significant increase was observed (p <0.001).

Conclusion: In our study, the skills of paramedics who had no E-FAST USG experience in distinguishing between normal and abnormal case images increased significantly after the training, and their success was observed to increase statistically significantly.

Keywords: Paramedic, FAST, USG.

Öz

Amaç: Çalışmamızda Travmada sonografi ile odaklanmış değerlendirme (FAST) eğitimi için bir saatlik bir kısa eğitim modelinin daha önce bu konuda eğitimi olmayan paramediklerin görsel becerisini artırıp artırmayacağını test etmek amaçlandı.

Gereç ve Yöntem: Çalışmamız prospektif tasarlanmış kontrolsüz deneysel çalışma olarak planlandı. E-FAST Ultrasonografi (USG) konusunda deneyimsiz 27 paramediğe kısa eğitim modülü ilk test uygulandı ve eğitim sonrası son test uygulanarak normal ve patolojik vaka görüntülerini ayırmadaki başarıları değerlendirildi.

Bulgular: Katılımcıların %55,6'sı kadın, %74,1'i yeni mezun ve yaş ortalamaları 21,58 ± 9,60 yıldı. İlk test ve son teste katılımcıların verdikleri yanıtlar değerlendirildiğinde; ilk testte birçok soruda katılımcıların %31,9 unda anlayamadım yanıtı var iken eğitim sonrasında %82,9 tüm testler için fikir yürütülebildiği görüldü. Katılımcıların ilk test ve son teste doğru yanıt oranlarına bakıldığında istatistiksel olarak anlamlı artış görüldü (p<0,001).

Sonuç: Çalışmamızda hiçbir E-FAST USG deneyimi olmayan paramediklerin eğitim sonrasında normal ve anormal vaka görüntülerini ayırt etmede becerileri anlamlı miktarda arttı ve başarılarının istatistiksel olarak anlamlı derecede arttığı görüldü.

Anahtar Kelimeler: Paramedik, FAST, USG.

1. Introductıon

Trauma originated from the Greek word "τραύμα" meaning wound, and is defined as a local wound that occurs as a result of disruption of a tissue or organ structure and shape by an external mechanical force (1). While trauma-related deaths are the 4th most common cause of death in all age groups, they are the most common cause of death in adults under 40 (2). In traumatic injuries, many vital functions are affected simultaneously and require rapid intervention. Various algorithms are constantly being developed and renewed to reduce these reversible causes of death. These algorithms enable early diagnosis and intervention (3).

Management of the trauma patient starts with evaluating the patient before arrival at the hospital. The pre-hospital evaluation aims to intervene immediately in life-threatening injuries, prevent additional trauma and injury, and ensure rapid and reliable transport to a trauma center. Most injuries resulting in mortality and morbidity in out-of-hospital trauma are related to airways, breathing, and circulation. Paramedics are professional health technicians who constitute an important part of emergency care services before and after hospitalization and often intervene in critical situations. In this context, paramedics are important parts of emergency health care services, providing primary care by recognizing patients' problems, providing emergency care when necessary, and ensuring the safety of themselves, the patient, and the team (4).

Traumas resulting in death can be categorized into three groups according to the time of death. The first group (50% of all trauma-related deaths) occurs at the scene within seconds and minutes after the accident. Deaths in the second group (30% of all trauma-related deaths) occur within minutes and the first few hours after the injury in the 'golden hour.' Early and effective intervention in the golden hour can save this group of patients. The third group of deaths (20% of all trauma-related deaths) usually occur in the intensive care unit, often within days or weeks, and are caused by sepsis or multiorgan failure in the hospital. The patients in whom healthcare personnel working in emergency departments or ambulances can be most useful are those in whom the intervention is performed in the golden hour (5).

Ultrasound examination performed as part of the initial examination and resuscitation of a trauma patient is known as "Focused Assessment with Sonography for Trauma (FAST)" (6). Extended-Focused Assessment with Sonography for Trauma (E-FAST)- Extended Emergency Trauma Ultrasonography (GATUS), which includes thoracic evaluation, has recently started to be included in the literature (7-9). The first role of Ultrasonography (USG) is to detect intraperitoneal free fluid in patients presenting with blunt trauma. FAST aims to determine whether fluid is in the area where it should not normally be. There needs to be more than USG to determine what the fluid is. Since it does not contain ionizing radiation and does not require contrast like direct radiography and CT, it can be used frequently in pediatric and pregnant trauma patients, and it is a good diagnostic method in blunt and penetrating trauma because it is fast, reliable, and non-invasive. USG is sensitive in diagnosing, even in as little as 100 ml of fluid.

The success of USG depends on the user and is directly related to the experience of the practitioner. The aim of this study was to determine the success of paramedics in evaluating USG images before practical training, which is both expensive and time consuming, will provide important information about the success of all E-FAST training.

2. Materials And Methods

2.1. Study Design

The study was planned as a prospective non-controlled experimental study. The study was a face-to-face interview with an initial and post-test, with a short training module between the two tests and training on E-FAST. In this study, a total of 28 video clips containing pathologic and non-pathologic images of intra-abdominal and intra-thoracic injuries were presented to paramedics as a test. The materials were collected from hospital archives or online sources from previously CT-confirmed cases. Participants were first asked whether they could recognize pathology, if any. After the tests were completed, they were collected. In the next stage, a 60-minute theoretical training was presented with these materials. Pericardial window, perihepatic window (Morrison pouch), peri splenic window, substernal, thoracic window, and pelvic window (Douglas pouch) were used in training. Following the training, paramedics were administered a post-test with the same questions as the pre-test. Paramedics needed more information about the number of pathologic and normal videos used in the test. Statistical methods compared differences between the answers.

2.2. Patients and Setting

There are 37 paramedics working in our hospital. 27 paramedics who agreed to participate in the study were included in the study. 27 paramedic-graduated healthcare personnel without training in FAST USG participated. All participants voluntarily participated in the study. Those who wanted to leave the study during the study period were excluded.

2.3. Data Collection

The pre-test and post-test results applied to the participants were noted on the data recording form. Along with this information, age, gender, duration of study, and demographic data of the participants were also noted and used for analysis.

2.4. Ethical Aspect of the Research

Ethics committee approval was obtained with the decision of İzmir Katip Çelebi University Non-Interventional Clinical Research Ethics Committee, dated 06.02.2019 and numbered 44.

2.5. Statistical Analysis

SPSS 20.0 package program was used to analyze the data obtained from the sample. The Shapiro-Wilk test was performed to determine whether the sample group was normally distributed regarding independent variables. Number and percentage values were given for summary values of categorical variables. The results showed that the sample group was not normally distributed regarding the independent variables examined, and therefore, nonparametric analysis methods were used. Pearson chi-square test was used to compare independent binary variables. All analyses were performed at a 95% confidence interval. For statistical significance, $p<0.05$ was accepted.

3. Results

In our study, 27 paramedic healthcare personnel participated. Of the participants, 55.6% (n=15) were female. The mean age was 21.58 ± 9.60 years. 74.1% (n=20) of the participants were newly graduated paramedic healthcare personnel. The distribution of accuracy rates of the subject's answers to the initial and post-test questions are presented in Tables 1 and 2.

Table 1. Distribution Of The Accuracy Rates Of The Participants' Answers To The First Test

Questions	First Test Answers			First Test Accuracy Rate		
	Normal n (%)	Abnormal n (%)	Couldn't Recognize n (%)	Right n (%)	False n (%)	Couldn't Recognize n (%)
Hepatorenal						
Question 2	11 (40.7)	16 (59.3)	0 (0.0)	12 (44.4)	15 (55.6)	0 (0.0)
Question 5	10 (37.0)	15 (55.6)	2 (7.4)	15 (55.6)	10 (37.0)	2 (7.4)
Question 13	14 (51.9)	10 (37.0)	3 (11.1)	10 (37.0)	14 (51.9)	3 (11.1)
Question 22	9 (33.3)	10 (37.0)	8 (29.6)	10 (37.0)	9 (33.39)	8 (29.6)
	44 (40.7)	51 (47.2)	13 (12.0)	47 (43.5)	48 (44.4)	13 (12.0)
Splenorenal						
Question 1	15 (55.6)	5 (18.5)	7 (25.9)	5 (18.5)	15 (55.6)	7 (25.9)
Question 9	12 (44.4)	9 (33.3)	6 (22.2)	9 (33.3)	12 (44.4)	6 (22.2)
Question 24	3 (11.1)	9 (33.3)	15 (55.6)	9 (33.3)	3 (11.1)	15 (55.6)
Question 25	15 (55.6)	7 (25.9)	5 (18.5)	15 (55.6)	7 (25.9)	5 (18.5)
	45 (41.7)	30 (27.8)	33 (30.6)	38 (35.2)	37 (34.3)	33 (30.6)
Transthoracic						
Question 12	3 (11.1)	2 (7.4)	22 (81.5)	2 (7.4)	3 (11.1)	22 (81.5)
Question17	4 (14.8)	11 (40.7)	12 (44.4)	4 (14.8)	11 (40.7)	12 (44.4)
Question 20	9 (33.3)	5 (18.5)	13 (48.1)	5 (18.5)	9 (33.3)	13 (48.1)
Question 26	7 (25.9)	5 (18.5)	15 (55.6)	5 (18.5)	7 (25.9)	15 (55.6)
	23 (21.3)	23 (21.3)	62 (57.4)	16 (14.8)	30 (27.8)	62 (57.4)
Right pleura						
Question 7	1 (3.7)	13 (48.1)	13 (48.1)	11 (40.7)	3 (11.1)	13 (48.1)
Question 14	1 (3.7)	16 (59.3)	10 (37.0)	15 (55.6)	2 (7.4)	10 (37.0)
Question18	2 (7.4)	16 (59.3)	9 (33.3)	16 (59.3)	2 (7.4)	9 (33.3)
Question 21	5 (18.5)	13 (48.1)	9 (33.3)	5 (18.5)	13 (48.1)	8 (33.3)
	9 (8.3)	54 (50.0)	45 (41.7)	47 (43.5)	20 (18.5)	41 (38.0)
Left pleura						
Question 6	3 (11.1)	13 (48.1)	11 (40.7)	13 (48.1)	3 (11.1)	11 (40.7)
Question 15	3 (11.1)	11 (40.7)	13 (48.1)	11 (40.7)	3 (11.1)	13 (48.1)
Question 16	11 (40.7)	9 (33.3)	7 (25.9)	9 (33.3)	11 (40.7)	7 (25.9)
Question 27	4 (14.8)	14 (51.9)	9 (33.3)	14 (51.9)	4 (14.8)	9 (33.3)
	21 (19.4)	47 (43.5)	40 (37.0)	47 (43.5)	21 (19.4)	40 (37.0)
Suprapubic						
Question 4	11 (40.7)	4 (14.8)	12 (44.4)	11 (40.7)	4 (14.8)	12 (44.4)
Question 11	3 (11.1)	12 (44.4)	12 (44.4)	12 (44.4)	3 (11.1)	12 (44.4)
Question 19	16 (59.3)	3 (11.1)	8 (29.6)	3 (11.1)	16 (59.3)	8 (29.6)
Question 28	1 (3.7)	22 (81.5)	4 (14.8)	1 (3.7)	22 (81.5)	4 (14.8)
	31 (28.7)	41 (38.0)	36 (33.3)	27 (25.0)	45 (41.7)	36 (33.3)
Subxiphoid						
Question 3	6 (22.2)	19 (70.4)	2 (7.4)	20 (74.1)	5 (18.5)	2 (7.4)
Question 8	10 (37.0)	9 (33.3)	8 (29.6)	10 (37.0)	9 (33.3)	8 (29.6)
Question 10	8 (29.6)	16 (59.3)	3 (11.1)	16 (59.3)	8 (29.6)	3 (11.1)
Question 23	13 (48.1)	10 (37.0)	4 (14.8)	10 (37.0)	13 (48.1)	4 (14.8)
	37 (34.3)	54 (50.0)	17 (15.7)	56 (51.9)	35 (32.4)	17 (15.7)

When the post-test answers of the participants were examined, it was seen that almost all of the video clips interpreted as unrecognizable in the first test answers disappeared in the post-test (Tables 1 and 2).

Table 2. Distribution Of Participants' Answers To The Post-Test And Their Accuracy

Questions	First Test Answers			First Test Accuracy Rate		
	Normal n (%)	Abnormal n (%)	Couldn't Recognize n (%)	Right n (%)	False n (%)	Couldn't Recognize n (%)
Hepatorenal						
Question 1	26 (96.3)	1 (3.7)	0 (0.0)	26 (96.3)	1 (3.7)	0 (0.0)
Question 9	0 (0.0)	27 (100.0)	0 (0.0)	27 (100.0)	0 (0.0)	0 (0.0)
Question 11	1 (3.7)	24 (88.9)	2 (7.4)	24 (88.9)	1 (3.7)	2 (7.4)
Question 20	1 (3.7)	25 (92.6)	1 (3.7)	25 (92.6)	1 (3.7)	1 (3.7)
	28 (25.9)	77 (71.3)	3 (2.8)	102 (94.4)	3 (2.8)	3 (2.8)
Splenorenal						
Question 2	1 (3.7)	26 (96.3)	0 (0.0)	26 (96.3)	1 (3.7)	0 (0.0)
Question 12	1 (3.7)	23 (85.2)	3 (11.1)	23 (85.2)	1 (3.7)	3 (11.1)
Question 16	20 (74.1)	5 (18.5)	2 (7.4)	20 (74.1)	5 (18.5)	2 (7.4)
Question22	24 (88.9)	3 (11.1)	0 (0.0)	24 (88.9)	3 (11.1)	0 (0.0)
	22 (20.4)	78 (72.2)	8 (7.4)	93 (86.1)	7 (6.5)	8 (7.4)
Transthoracic						
Question 3	22 (81.5)	5 (18.5)	0 (0.0)	22 (81.5)	5 (18.5)	0 (0.0)
Question 7	0 (0.0)	27 (100.0)	0 (0.0)	27 (100.0)	0 (0.0)	0 (0.0)
Question18	1 (3.7)	24 (88.9)	2 (7.4)	24 (88.9)	1 (3.7)	2 (7.4)
Question 26	1 (3.7)	26 (96.3)	0 (0.0)	26 (96.3)	1 (3.7)	0 (0.0)
	24 (22.2)	82 (75.9)	2 (1.9)	99 (91.7)	7 (6.5)	2 (1.9)

Table 2 (continue). Distribution Of Participants' Answers To The Post-Test And Their Accuracy

Right pleura						
Question 4	5 (18.5)	22 (81.5)	0 (0.0)	22 (81.5)	5 (18.5)	0 (0.0)
Question 14	6 (22.2)	21 (77.8)	0 (0.0)	21 (77.8)	6 (22.2)	0 (0.0)
Question 21	11 (40.7)	14 (51.9)	2 (7.4)	11 (40.7)	14 (51.9)	2 (7.4)
Question 23	4 (14.8)	22 (81.5)	1 (3.7)	22 (81.5)	4 (14.8)	1 (3.7)
	26 (24.1)	79 (73.1)	3 (2.8)	76 (70.4)	29 (26.9)	3 (2.8)
Left pleura						
Question 5	14 (51.9)	10 (37.0)	3 (11.1)	14 (51.9)	10 (37.0)	3 (11.1)
Question 10	21 (77.8)	4 (14.8)	2 (7.4)	21 (77.8)	4 (14.8)	2 (7.4)
Question 15	7 (25.9)	13 (48.1)	7 (25.9)	13 (48.1)	7 (25.9)	7 (25.9)
Question 24	10 (37.0)	16 (59.3)	1 (3.7)	16 (59.3)	10 (37.0)	1 (3.7)
	52 (48.1)	43 (39.8)	13 (12.0)	60 (55.6)	35 (32.4)	13 (12.0)
Suprapubic						
Question 6	21 (77.8)	6 (22.2)	0 (0.0)	21 (77.8)	6 (22.2)	0 (0.0)
Question 8	0 (0.0)	27 (100.0)	0 (0.0)	27 (100.0)	0 (0.0)	0 (0.0)
Question 19	5 (18.5)	22 (81.5)	0 (0.0)	22 (81.5)	5 (18.5)	0 (0.0)
Question 27	0 (0.0)	27 (100.0)	0 (0.0)	27 (100.0)	0 (0.0)	0 (0.0)
	26 (24.1)	82 (75.9)	0 (0.0)	97 (89.8)	11 (10.2)	0 (0.0)
Subxiphoid						
Question 13	4 (14.8)	22 (81.5)	1 (3.7)	22 (81.5)	4 (14.8)	1 (3.7)
Question17	0 (0.0)	27 (100.0)	0 (0.0)	27 (100.0)	0 (0.0)	0 (0.0)
Question 25	1 (3.7)	24 (88.9)	2 (7.4)	24 (88.9)	1 (3.7)	2 (7.4)
Question 28	27 (100.0)	0 (0.0)	0 (0.0)	27 (100.0)	0 (0.0)	0 (0.0)
	32 (29.6)	73 (67.6)	3 (2.8)	100 (92.6)	5 (4.6)	3 (2.8)

In our study, while creating the test questions, it was questioned whether normal pathological images related to 7 regions (hepatorenal, right pleura, subxiphoid, splenorenal, left pleura, transthoracic and suprapubic) included in the Extended FAST algorithm were recognized. A total of 28 questions were asked four questions for each region. The pre-test and post-test answers to these questions are given in Tables 1 and 2.

When the comparisons of the answers given to the questions related to the regions in the first test and post-test were examined with each other, there was a statistically significant increase in the correct answers in the hepatorenal, right pleural, subxiphoid, splenorenal, left pleural, left pleural, transthoracic and suprapubic regions in the post-test. There is also a significant decrease in the "I did not understand" response in the cases. In addition, when a comparison was made between the regions, 57.4% (n=62) of the participants in the transthoracic region, which had the least number of correct answers in the first test results, did not understand, and 25% in the suprapubic region, which had the second least number of correct answers. After the training, the correct response rate of these participants increased to 91.7% in the transthoracic region and 89.8% in the suprapubic region questions (p<0.001). Similarly, when the post-test responses were analyzed, the lowest response rate was in the left pleural region test questions. In this region, while the correct response rate was 43.5% before the training, it increased to 55.6% after the training (p<0.001). When all the results were analyzed, while the number of all answers was close to each other at the beginning, the correct answer rate increased from 36.9% to 82.9% in the post-test, and the incorrect answer rate increased from 31.1% to 12.9%, and the response "I did not understand" decreased from 31.9% to 4.2%. These results were statistically significant (p<0.001). This shows that this situation increased due to the increased level of knowledge due to the training given in the short training module between the tests and that the training was successful. This result was also statistically significant (Table 3).

Table 3. Comparison of the accuracy of the answers to the first and posttest given by regions

Question Groups	Answers	Groups: First test n (%)	Groups: Posttest n (%)	p*
Hepatorenal	Right	47 (43,5)	102 (94,4)	<0,001
	False	48 (44,4)	3 (2,8)	
	Couldn't understand	13 (12,0)	3 (2,8)	
Right Pleura	Right	47 (43,5)	76 (70,4)	<0,001
	False	20 (18,5)	29 (26,9)	
	Couldn't understand	41 (38,0)	3 (2,8)	
Subxiphoid	Right	56 (51,9)	100 (92,6)	<0,001
	False	35 (32,4)	5 (4,6)	
	Couldn't understand	17 (15,7)	3 (2,8)	
Splenorenal	Right	38 (35,2)	93 (86,1)	<0,001
	False	37 (34,3)	7 (6,5)	
	Couldn't understand	33 (30,6)	8 (7,4)	
Left Pleura	Right	47 (43,5)	60 (55,6)	<0,001
	False	21 (19,4)	35 (32,4)	
	Couldn't understand	40 (37,0)	13 (12,0)	
Transthoracic	Right	16 (14,8)	99 (91,7)	<0,001
	False	30 (27,8)	7 (6,5)	
	Couldn't understand	62 (57,4)	2 (1,9)	
Suprapubic	Right	27 (25,0)	97 (89,8)	<0,001
	False	45 (41,7)	11 (10,2)	
	Couldn't understand	36 (33,3)	0 (0,0)	
All zones Total	Right	280 (36,9)	625 (82,9)	<0,001
	False	236 (31,1)	97 (12,9)	
	Couldn't understand	242 (31,9)	32 (4,2)	

4. Discussion

This study aimed to determine the effectiveness of a short training module on extended FAST in visually detecting potentially life-threatening abdominal and thoracic injuries in trauma patients by paramedics working in emergency health services.

Paramedics, who have important duties in the pre-hospital unit, will provide important benefits in treating trauma patients by receiving USG training to determine the injury site in trauma patients. There are few studies on this subject in the literature. A clear profit and loss distinction could not be made in the studies that have already been conducted.

FAST trainers stated that to perform FAST/E-FAST in trauma patients, physicians or healthcare personnel should associate it with the examination. It is also believed that methods including learning and practising FAST/E-FAST application, watching training videos from real cases, animal and simulator training models, cadavers, and normal human models should be used to complete this training (10-13) successfully.

In the study by Swamy et al. titled "Performing and interpreting non-physician lung USG," it was observed that nurses and students were successful in recognizing and interpreting pathologies after lung USG application following a short training module (14). In the study conducted by Marsh-Feiley et al., the issue of whether pre-hospital USG performed by paramedics and physicians would be useful was investigated. As a result of this study, it was concluded that the training to be provided was not easy, would not be useful in urban areas, and was unnecessary (15).

Again, in the study by Bøtker et al., the role of USG performed in critically ill patients before hospitalization was examined. As a result, it was stated that the treatment protocol changed. However, it was unclear to what extent the patients benefited from this and that combined training with complex examination techniques was required in addition to E-FAST (16).

A case study showed that pericardial tamponade was detected in USG performed in a pregnant patient taken from the field, so a rapid treatment was planned by making preparations, and the patient benefited from this situation (17). In a study conducted by Walcher et al., it was reported that performing E-FAST in trauma patients before hospitalization was beneficial for surgical triage (18). In a study by Strode et al. on "satellite-assisted interpretability of E-FAST application performed in the field for trauma patients," it was reported that E-FAST performed in the pre-hospital process could be interpreted online. Thus pre-hospital triage was performed and was beneficial (19).

In this study, after the normal and pathological E-FAST USG case images were shown to the paramedics, it was observed that the paramedics recognized the normal or pathological images, and there was a significant increase in the participants' identification of pathologies after the short training module.

Determining whether there are thoracic and intra-abdominal injuries in trauma patients before the hospital and in which region, if any, has an important place in pre-hospital triage and determining the appropriate and comprehensive health institution for the patient according to the injury status. As a result of this situation, it is seen that even with only the theoretical training given, paramedics can distinguish between normal and pathology to a great extent (20).

While most of the participants stated that they did not understand the questions in the majority of the first test questions, they answered the questions after the short training module, and the number of correct answers increased statistically significantly when the first test and the post-test were compared ($p<0.001$). This suggests that it is useful in distinguishing normal and pathologic case images even with a short training module. Both theoretical and practical success will increase with more comprehensive training.

E-FAST regions were created for the first test and post-test. A total of 4 video questions about seven regions were created. When the answers given to these regions were analyzed by classifying them, it was seen that the transthoracic region questions with the least correct answers in the first test were answered correctly at a higher rate in the post-test after the training. Again, it was thought that the left pleural region, which had the least correct answers in the post-test region questions, needed to be clearly understood by the paramedics, and it would be useful to explain these regions in more detail in the training given.

In our study, the post-test was administered immediately after the training, and the long-term effectiveness of the training could not be evaluated. Increasing the number of participants in future studies will provide more accurate data.

5. Conclusion and Recommendations

Our study concluded that paramedics' success in recognizing USG images, which is an important step for the successful use of E-FAST USG application in the triage of pre-hospital trauma patients, can be increased with a short training model. We predict that USG can be used safely by paramedics in trauma patients as a result of effective practical training to be given together with the theoretical training similar to our study.

6. Contribution to the Field

We believe that determining the effectiveness of these trainings will contribute to the literature, as it may enable pre-hospital paramedics to effectively perform triage of trauma patients.

Ethical Aspect of the Research

Ethics committee approval was obtained with the decision of İzmir Katip Çelebi University Non-Interventional Clinical Research Ethics Committee, dated 06.02.2019 and numbered 44.

Conflict of Interest

This article did not receive any financial fund. There is no conflict of interest regarding any person and/or institution.

Authorship Contribution

Concept: AY, FET, AK; **Design:** EEG, MGE, OSÇ; **Supervision:** AY, EEG, MGE, OSÇ; **Funding:** FET, AK; **Materials:** AY, EEG;

Data Collection/Processing: AY, MGE, OSÇ; **Analysis/ Interpretation:** FET, AK; **Literature Review:** EEG, MGE, OSÇ; **Manuscript Writing:** AY, FET, AK; **Critical Review:** AY, FET, AK, MGE, OSÇ.

References

1. Türk Dil Kurumu 2016 http://www.tdk.gov.tr.

2. İpekçi F. İlk ve Acil Yardım. In: Ertekin C, Taviloğlu K, Güloğlu R, Kurtoğlu M (Editör). Travma. First. İstanbul: İstanbul Medikal Yayıncılık; 2005;123-33.

3. Clarke JR, Trooskin SZ, Doshi PJ, Greenwald L, Mode CJ. Time to laparotomy for intra- abdominal bleeding from trauma does affect survival for delays up to 90 minutes. J Trauma 2002;52:420-5.

4. Audrey, A., Reichard, MPH. OTR., Suzanne, M., Marsh, MPA., Paul, H.,Moore, BSME., (2011). Fatal and Nonfatal Injuries Among Emergency Medical Technicians and Paramedics, Prehospital Emergency Care, 4 (15), 511-7.

5. Coşkun F, Akıncı E, Ceyhan MA, Sahin Kavaklı H. Our new stethoscope in the emergency department: handheld ultrasound. Ulus Travma Acil Cerrahi Derg 2011;17:488-92

6. American Institute of Ultrasound in M, American College of Emergency P. AIUM practice guideline for the performance of the focused assessment with sonography for trauma (FAST) examination. J Ultrasound Med 2014;33(11):2047-56.

7. Dulchavsky SA, Schwarz KL, Kirkpatrick AW, Billica RD, Williams DR, Diebel LN, et al. Prospective evaluation of thoracic ultrasound in the detection of pneumothorax. J Trauma 2001;50:201-5.

8. Kirkpatrick AW, Nicolaou S, Rowan K, Liu D, Cunningham J, Sargsyan AE, et al. Thoracic sonography for pneumothorax: the clinical evaluation of an operational space medicine spin-off. Acta Astronaut 2005;56:831-8.

9. Kirkpatrick AW, Sirois M, Laupland KB, Liu D, Rowan K, Ball CG, et al. Hand-held thoracic sonography for detecting post-traumatic pneumothoraces: the Extended Focused Assessment with Sonography for Trauma (EFAST). J Trauma 2004;57(2):28895.

10. Salen PN, Melanson SW, Heller MB. The Focused Abdominal Sonography for Trauma (FAST) Examination: Considerations and Recommendations for Training Physicians in the Use of a New Clinical Tool. Academic Emergency Medicine 2000;7:162-8.

11. Shackford SR, Rogers FB, Osler TM, Trabulsy ME, Clauss DW, Vane DW. Focused abdominal sonogram for trauma: the learning curve of nonradiologist clinicians in detecting hemoperitoneum. J Trauma 1999;46:553-62; discussion 62-4.

12. Thomas B, Falcone RE, Vasquez D, et al. Ultrasound evaluation of blunt abdominal trauma: program implementation, initial experience, and learning curve. J Trauma 1997;42:384-8; discussion 8-90.

13. Frezza EE, Solis RL, Silich RJ, Spence RK, Martin M. Competency-based instruction to improve the surgical resident technique and accuracy of the trauma ultrasound. Am Surg 1999;65:884-8.

14. Swamy V, Brainin P, Biering-Sørensen T, Platz E. Ability of non-physicians to perform and interpret lung ultrasound: A systematic review. Eur J Cardiovasc Nurs. 2019 Apr 24:1474515119845972.

15. Marsh-Feiley G, Eadie L, Wilson P. Paramedic and physician perspectives on the potential use of remotely supported prehospital ultrasound. Rural Remote Health. 2018 Sep;18(3):4574.

16. Bøtker MT, Jacobsen L, Rudolph SS, Knudsen L. The role of point of care ultrasound in prehospital critical care: a systematic review. Scand J Trauma Resusc Emerg Med. 2018 Jun 26;26(1):51.

17. Byhahn C, Binbold TM, Zwissler B, Maier M, Walcher F. Prehospital ultrasound detects pericardial tamponade in a pregnant victim of stabbing assault. Resuscitation 2008; 76:146–148.

18. Walcher F, Weinlich M, Conrad G, Schweigkofler U, Breitkreutz R, Kirsching T, et al. Prehospital ultrasound imaging improves management of abdominal trauma. Br J Surg 2006; 93:238–242.

19. Strode CA, Rubal BJ, Gerhardt RT, Bulgrin JR, Boyd SYN. Wireless and satellite transmission of prehospital focused abdominal sonography for trauma. Prehosp Emerg Care 2003; 7:375–379.

20. Planas JH, Waseem M, Sigmon DF. Trauma Primary Survey. [Updated 2023 Apr 10]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-.